

Agency: Commerce, Community and Economic Development**Grants to Municipalities (AS 37.05.315)****Grant Recipient: Kodiak Island Borough****Project Title:**

Kodiak Island Borough - Kodiak Schools Seismic Mitigation Project

State Funding Requested: \$ 4,000,000**House District: 36 - R**

Future Funding May Be Requested

Brief Project Description:

Mitigation of Seismic Hazards at Kodiak Middle School, Kodiak High School, Peterson Elementary and Ouzinkie School

Funding Plan:**Total Cost of Project: \$4,463,711**

	<u>Funding Secured</u>		<u>Other Pending Requests</u>		<u>Anticipated Future Need</u>	
	<i>Amount</i>	<i>FY</i>	<i>Amount</i>	<i>FY</i>	<i>Amount</i>	<i>FY</i>
Federal Funds	\$1,702,515	2008	\$540,508	2009		
State Funds	\$405,688	2007				
Total	\$2,108,203		\$540,508			

Detailed Project Description and Justification:

The Scope of work of this project includes the mitigation of Seismic Hazards at Kodiak Middle School, Kodiak High School, Peterson Elementary and Ouzinkie School.

These seismic hazards were identified in a Seismic Vulnerability Assessment of all schools in the Kodiak Island Borough School District completed by G&E Engineering Systems, Inc in February 2006. The study found that, for most of the buildings in the school district, the existing structural systems were designed with a reasonable capability to resist medium to quite large earthquakes. However, for portions of the three oldest buildings (Middle School, Ouzinkie, Peterson), they found there were significant deficiencies in the existing lateral force resisting system, such that a structural upgrade appears warranted. They also found some deficiencies at the High School Library Wing and Gym, largely through strength and stiffness discontinuities that were apparently overlooked in the original design.

They performed a series of benefit cost analyses, to examine how cost effective it is to perform the above upgrades. Using a discount rate of 7% and applying the FEMA-approved methodologies to perform such analyses they found that the BCR varies from 3.66 to 9.59 for the included four projects. Any project with a Benefit Cost Ratio of 1 or larger is deemed cost effective on an economic basis; in other words, the capital cost spent today is less than the benefits accrued from reduction in building damage, injury to people and other economic impacts from all future earthquakes over the remaining lifetime of the schools.

Project Timeline:

Construction timeline is June 2008 thru Sept 2009. Most expenditures will occur by Sept 2008.

Entity Responsible for the Ongoing Operation and Maintenance of this Project:

Kodiak Island Borough School District

Grant Recipient Contact Information:

Contact Name: Rick Gifford

Phone Number: (907) 486-9301

Address: 710 Mill Bay Rd., Kodiak, AK 99615

Email: rgifford@kodiakak.us

Funds for this project are located in the Governor's FY09 Budget:

No

Has this project been through a public review process at the local level and is it a community priority? ☒ Yes ☐ No

KIB

Seismic Vulnerability Assessment

Prepared for:

Kodiak Island Borough

by:

G&E Engineering Systems Inc.

*6315 Swainland Road
Oakland, CA 94611
(510) 595-9453 (510) 595-9454 (fax)
eidinger@earthlink.net*

Principal Investigator: John Eidinger, C.E. 11276

*G&E Report 87.01.05, Revision A (Draft)
November 19, 2005*

1.0 Introduction

This report describes a Seismic Vulnerability Assessment for all of the Kodiak Island Borough school buildings. This report is labeled *draft*, and will be revised to reflect comments and additional information yet to be finalized.

1.1 Executive Summary

A Seismic Vulnerability Assessment was performed of the Kodiak Island Borough school buildings. The assessment included all the buildings for 13 schools as well as the Learning Center. Several of the schools include multiple buildings, and each building was included in the assessment.

For each site / building, we evaluated six seismic hazards: ground shaking, surface faulting, liquefaction, tsunami, landslide and differential settlement. Given these seismic hazards, we evaluated how each building might perform in various size earthquakes.

The geologic hazard studies show that the level of earthquake motion that should be used for design of new facilities, to modern (2005) standards, should be about 18% to 40% larger than what was used for the design of most of the schools built since the mid-1960s. The 18% increase would reflect design using the seismic concepts in the Uniform Building Code (1997), which are set at providing for life safety for earthquakes that occur once every 475 years. The 40% increase would reflect design for even rarer earthquakes, as would be required if KIB adopts the latest provisions of the International Building Code, which are set at designing for life safety for 2/3 of an earthquake that might occur once every 2,475 years.

For those buildings where we recommend structural seismic upgrades, the upgrades should be designed to meet the intent of providing life safety service for earthquakes that occur once every 475 years.

For construction of future new buildings, we recommend that the higher standard (2/3 of 2,475 year earthquake) be used. This should provide immediate occupancy for the buildings should a 475-year earthquake occur, while still providing life safety reliability in the larger but rarer event.

For most of the buildings, the existing structural systems were designed with a reasonable capability to resist medium to quite large earthquakes. However, for portions of the three oldest buildings (Middle School, Ouzinkie, Peterson), we found there were significant deficiencies in the existing lateral force resisting system, such that a structural upgrade appears warranted. We also found some deficiencies at the High School Library Wing and Gym, largely through strength and stiffness discontinuities that were apparently overlooked in the original design.

In addition, we found that at essentially every school that there are a number of non-structural components that require anchorage or bracing. These components range from furnaces, heating and ventilation equipment, water tanks, library bookshelves, suspended ceilings, windows, etc. The cost to upgrade the essential items needed for building services is \$363,000. The cost to upgrade suspended ceilings just over main egress areas

would be an additional \$302,000. The cost to upgrade all suspended ceilings would be \$1,189,000. The cost of upgrading suspended ceilings has not been included in Table 1-1.

The complete seismic upgrade program would cost \$3,087,675 (\$2006). Table 1-1 summarizes the costs and benefits and the Benefit Cost Ratios (BCR) for the recommended upgrades.

School Building	Seismic Upgrade Cost ¹	Project Benefits	Benefit Cost Ratio
Middle School (1952, 1954 portion)	\$1,192,375	\$8,009,581	6.72
Ouzinkie (1969 portion)	\$149,000	\$975,410	7.55
Peterson (1946 portion)	\$508,500	\$1,862,173	3.66
High School Library Wing	\$464,500	\$4,452,695	9.59
High School Gym (Essential)	\$410,300	\$416,768	1.02
Non Structural Items	\$363,000	(later)	
Total	\$3,087,675 ²	\$15,716,627	5.09 ³

Table 1-1. Summary of Recommended Seismic Upgrades and BCRs

We performed a series of benefit cost analyses, to examine how cost effective it is to perform the above upgrades. Using a discount rate of 7%, and applying the FEMA-approved methodologies to perform such analyses, we found that the BCR varies from 1.02 to 9.59 for the recommended six projects when ranked individually, or 5.09 when considered as one large project. Any project with a Benefit Cost Ratio of 1 or larger is deemed cost effective on an economic basis; in other words, the capital cost spent today is less than the benefits accrued from reduction in building damage, injury to people and other economic impacts from all future earthquakes, over the remaining lifetime of the schools.

It is our opinion that all of the above listed projects are eligible for co-funding under FEMA's Pre-Disaster Mitigation program. We therefore recommend that KIB consider submitting a proposal to FEMA under its PDM-C 2006 program. The availability of funds under FEMA's 2006 program are uncertain due to the recent Hurricane Katrina, and it is possible that FEMA will not have sufficient funds in 2006 for all eligible projects.

Should co-funding from FEMA not be available under the FEMA 2006 PDM program, we recommend that KIB still implement all of the above projects, as soon as funds are available. The work should be prioritized to do early implementation of the projects with the highest BCRs, consistent with permitting, and coordinated with complementary operations and maintenance projects. All work should be completed by 2015 (ten years), reflecting the ongoing risk to the community. If resources are available, it is possible that all upgrades could be completed in four years (by end of summer 2009).

¹ Includes relocation costs during construction.

² Budget would be based on rounded figures to the nearest \$1000.

³ Benefits from upgrade of the non-structural items will be provided in a future submittal.

1.2 Other Improvements

During the course of our field visits, a few other maintenance related improvements were noted. These include:

- Install new roof at Old Harbor Gym building (improve roof drainage)
- Install new roof at Larsen Bay Gym Building (improve roof drainage)
- Remove soil backfills on walls at Karluk and Akhiok (reduce wall loading, long term water damage to building)

These upgrades would not likely be eligible for FEMA co-funding. They will be described in more detail in a future submittal.

1.3 Report Outline

The outline of the report is as follows:


- Section 2 describes the structural systems for each building where structural retrofits are recommended.
- Section 3 presents the seismic hazards for each building.
- Section 4 describes the Seismic Vulnerability Assessment for each building and describes recommended seismic retrofits for those buildings where upgrades are warranted and cost effective.
- Section 5 describes the fragility and damage states for each building selected for seismic upgrade. Section 5 also presents risk summaries for all buildings, even those not recommended for seismic upgrade.
- Section 6 describes the benefit cost analyses in context of FEMA's PDM-C program.

FY - 09 Capital Budget
Six-Year Capital Improvement Plan

District: Kodiak Island Borough School District Date: August 23, 2007 Page 1 of 5 Pages

District Priority	Project Location and Description	Primary Purpose	Year for which funding is being requested						Estimated Cost
			FY08	FY09	FY10	FY11	FY12	FY13	
1	Kodiak Schools Seismic Mitigation Project	D	X						\$1,814,844
2	Old Harbor: Earthquake Mitigation Plan (Install Drainage Behind Gym)	D		X					\$ 82,500
3	Middle School: Earthquake Mitigation Plan (New Retaining Wall)	D		X					\$ 82,500
4	North Star: Earthquake Mitigation Plan (Install Drainage Behind Gym)	D		X					\$ 165,000
5	Old Harbor Gym: Earthquake Mitigation Plan (Replace with Sloped Roof)	D		X					\$ 330,000
6	Larsen Bay Gym Old Wing: Earthquake Mitigation Plan (Replace with Sloped Roof)	D		X					\$ 330,000

I hereby certify that the information presented is true and correct to the best of my knowledge.

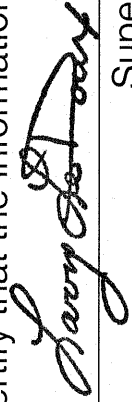
Signed  Date 8-27-07
Superintendent

FY - 09 Capital Budget
Six-Year Capital Improvement Plan

District: Kodiak Island Borough School District Date: August 23, 2007 Page 2 of 5 Pages

District Priority	Project Location and Description	Primary Purpose	Year for which funding is being requested						Estimated Cost
			FY08	FY09	FY10	FY11	FY12	FY13	
7	Village: Earthquake Mitigation Plan (Karluk, Akhiok, Chiniak, Remove Uphill Slopes from Back of Building)	D		X					\$ 495,000
8	District Wide: Earthquake mitigation plan (Suspended Ceiling Upgrade)	D		X					\$ 2,559,254
9	District Wide: Earthquake Mitigation Plan (Non Structural)	D		X					\$ 593,086
10	Install Generator Plug and Emergency Panel (East, Peterson, and North Star Generator Move)	D			X				\$ 92,055
11	Install Generators and Building at Old Harbor and Port Lions.	D			X				\$ 452,000
12	High School: Upgrade Generator	D			X				\$ 449,625

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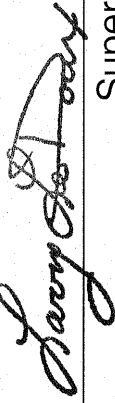
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Six-Year Capital Improvement Plan

District: Kodiak Island Borough School District Date: August 23, 2007 Page 3 of 5 Pages

District Priority	Project Location and Description	Primary Purpose	Year for which funding is being requested						Estimated Cost
			FY08	FY09	FY10	FY11	FY12	FY13	
13	Village Generator Repair and Replacement (Ouzinkie, Karluk)	D			X				\$ 453,750
14	East: Improve Traffic Flow	D				X			\$ 495,000
15	Middle School: Install New Fire Suppression In Server Room	D				X			\$ 41,000
16	District Wide Security Video Surveillance	A				X			\$ 165,000
17	District Wide Playground Replacement	A				X			\$ 330,000
18	Main: Upgrade Crossing Lights/Flashers	A				X			\$ 41,000

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Superintendent

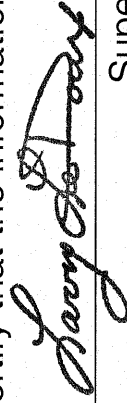
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Six-Year Capital Improvement Plan

District: Kodiak Island Borough School District Date: August 23, 2007 Page 4 of 5 Pages

District Priority	Project Location and Description	Primary Purpose	Year for which funding is being requested						Estimated Cost
			FY08	FY09	FY10	FY11	FY12	FY13	
19	North Star: Install Crossing Lights/Flashers for Safety on Road	A				X			\$ 41,000
20	Fire Alarm Panel Upgrades (High School, KMS, Auditorium, East, Karluk)	A					X		\$ 297,000
21	Install Fire Alarm Magnetic Door closures in KMS, East, High School	A					X		\$ 214,500
22	New Kodiak High School	F					X		\$67,500,000
23	North Star: Classroom Addition	F					X		\$3,548,325
24	Village Teacher Housing (1 Fourplex and 2 Duplexes in the Villages) Phase I	E					X		\$1,000,000

I hereby certify that the information presented is true and correct to the best of my knowledge.

Signed



Superintendent

Date

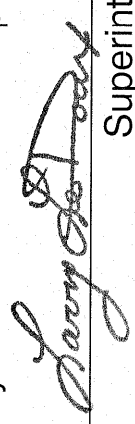
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District: Kodiak Island Borough School District Date: August 23, 2007 Page 5 of 5 Pages

District Priority	Project Location and Description	Primary Purpose	Year for which funding is being requested						Estimated Cost
			FY08	FY09	FY10	FY11	FY12	FY13	
25	Add Shelter Storage and Regular Storage to all Schools	A						X	\$ 600,000
26	New Shipping and Receiving Building	E						X	\$ 4,800,000
27	Multi Use Wellness Facility	F						X	\$ 4,000,000
28									
29									
30									

I hereby certify that the information presented is true and correct to the best of my knowledge.

Signed  Date 8-27-07
Superintendent

Kodiak Island Borough

Project Title: Kodiak Island Borough School District - Districtwide Earthquake Mitigation Rehabilitation Projects

Amount: \$4,000,000

Project Description: Funding addresses several structural seismic vulnerabilities identified in a districtwide, locally funded engineering assessment. Specific projects include retaining walls, drainage improvements, roof replacements, suspended ceilings repairs, and other improvements at all school district facilities. This includes, but is not limited to, projects for the following schools: Old Harbor, Kodiak Middle, Kodiak High, Peterson, North Star, Larsen Bay, Karluk, Chiniak, and Akhiok.

Kodiak School facilities have been examined for their ability to withstand earthquakes that occur frequently in Kodiak. A structural engineering firm was contracted to perform the calculations and review potential ground motions and determine how these buildings would respond to ground shaking. Many of the buildings have been found to be deficient, but with seismic retrofitting and a benefit/cost analysis that demonstrates that these upgrades are cost efficient, these community facilities can have an extended useful life. The dollar figure associated with this requests is derived by taking the total cost of the projects identified in the engineering study; adds the increase in building cost escalation; then subtracts the amount of total federal and state grants that the Borough has received to date for these projects as well as the local Borough contribution to these grants and general fund contribution.